

CLAIMS

What is claimed is:

- 5 1. A circuit board module, comprising:
- a circuit board having surface mount pads;
- a circuit board component mounted to the circuit board; and
- a heat sink assembly including:
- a heat sink,
- 10 a first clip holder and a second clip holder, each clip holder
- being mounted to respective surface mount pads of the circuit
- board using a surface mount technology soldering process, and
- a clip having a first portion configured to fasten to the first
- 15 clip holder, a second portion configured to fasten to the second clip
- holder, and a third portion coupled to the first and second portions,
- the third portion being configured to position the heat sink adjacent
- the circuit board component when the first and second portions are
- respectively fastened to the first and second clip holders.
- 20 2. The circuit board module of claim 1 wherein each clip holder is elongated in
- shape and includes (i) a first surface mount contact at a first end and (ii) a second
- surface mount contact at a second end opposite the first end, and wherein the
- surface mount contacts of each clip holder define apertures which are substantially
- perpendicular to a plane of the circuit board.

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3. A heat sink assembly, comprising:
a heat sink;
a first clip holder and a second clip holder, each clip holder being
configured to mount to surface mount pads of a circuit board using a surface
mount technology soldering process; and
5 a clip having a first portion configured to fasten to the first clip holder, a
second portion configured to fasten to the second clip holder, and a third portion
coupled to the first and second portions, the third portion being configured to
position the heat sink adjacent a circuit board component on the circuit board
10 when the first and second clip holders are mounted to the surface mount pads of
the circuit board and when the first and second portions are respectively fastened
to the first and second clip holders.
4. The heat sink assembly of claim 3 wherein each clip holder is elongated in shape
15 and includes (i) a first surface mount contact at a first end and (ii) a second
surface mount contact at a second end opposite the first end.
5. The heat sink assembly of claim 4 wherein the surface mount contacts of each clip
holder define a plane which is substantially parallel to the circuit board when that
20 clip holder mounts to the surface mount pads of the circuit board, and wherein the
surface mount contacts of each clip holder further define apertures which are
substantially perpendicular to the plane.
6. The heat sink assembly of claim 5 wherein each clip holder further includes:
25 a non-conductive body portion interconnected between the first and second
surface mount contacts of that clip holder, the non-conductive body portion
defining a surface to interface with automated pick and place equipment.

7. The heat sink assembly of claim 6 wherein the non-conductive body portion of each clip holder defines a cavity for fastening with the clip, the cavity extending in a direction that is substantially parallel to the plane.
- 5 8. The heat sink assembly of claim 7 wherein each clip holder further includes:
an interconnecting conductive portion which electrically interconnects the first and second surface mount contacts of that clip holder, and wherein part of the interconnecting conductive portion is exposed within the cavity defined by the non-conductive body portion of that clip holder.
- 10 9. A heat sink clip holder, comprising:
a first surface mount contact configured to mount to surface mount pads of a circuit board using a surface mount technology soldering process, the first surface mount contact being disposed at a first end of the heat sink clip holder;
15 a second surface mount contact configured to mount to other surface mount pads of the circuit board using the surface mount technology soldering process, the second surface mount contact being disposed at a second end of the heat sink clip holder which is opposite the first end; and
a body portion interconnected between the first surface mount contact and
20 the second surface mount contact, the body portion being configured to fasten with a heat sink clip.
10. The heat sink clip holder of claim 9 wherein the surface mount contacts define (i) a plane which is substantially parallel to the circuit board when the heat sink clip
25 holder mounts to the surface mount pads of the circuit board, and (ii) apertures which are substantially perpendicular to the plane.

11. The heat sink clip holder of claim 10 wherein the body portion defines a surface to interface with automated pick and place equipment.
12. The heat sink clip holder of claim 10 wherein the body portion defines a cavity for engaging with the heat sink clip, the cavity extending in a direction that is substantially parallel to the plane.
13. A method for installing a heat sink, the method comprising:
 - disposing the heat sink over a circuit board component mounted to a circuit board;
 - fastening a first end of a clip to a first clip holder which is surface mounted to surface mount pads of the circuit board using a surface mount technology soldering process; and
 - fastening a second end of the clip to a second clip holder which is surface mounted to other surface mount pads of the circuit board using the surface mount technology soldering process, the clip positioning the heat sink adjacent the circuit board component when the first and second ends of the clip are fastened to the first and second clip holders which are surface mounted to the surface mount pads of the circuit board.
14. The method of claim 13 wherein the second clip holder defines a cavity which extends in a direction that is substantially parallel to a plane of the circuit board; wherein the method further comprises:
 - after the first end of the clip is fastened to the first clip holder, bending the clip to align the second end of the clip with the cavity defined by the second clip holder.

15. The method of claim 13, further comprising:

mounting the first and second clip holders to the surface mount pads of the circuit board using the surface mount technology soldering process.

5 16. The method of claim 15 wherein mounting includes:

disposing the first and second clip holders over the surface mount pads of the circuit board and in contact with printed solder paste using automated pick and place equipment; and

10 applying heat to melt the printed solder paste, activate flux within the printed solder paste and percolate gas through apertures defined by the first and second clip holders.

17. A heat sink assembly, comprising:

a heat sink;

15 surface mounting means for surface mounting to surface mount pads of a circuit board using a surface mount technology soldering process; and

a clip having a first portion configured to fasten to the surface mounting means, a second portion configured to fasten to the surface mounting means, and a third portion coupled to the first and second portions, the third portion being
20 configured to position the heat sink adjacent a circuit board component on the circuit board when the surface mounting means mounts to the surface mount pads of the circuit board and when the first and second portions are fastened to the surface mounting means.

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18. The heat sink assembly of claim 17 wherein the surface mounting means includes:
a set of clip holders, each clip holder being elongated in shape and
including (i) a first surface mount contact at a first end and (ii) a second surface
mount contact at a second end opposite the first end, each surface mount contact
5 including means for percolating gas therethrough.
19. The heat sink assembly of claim 18 wherein each clip holder further includes:
interfacing means for interfacing with automated pick and place
equipment.
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20. The heat sink assembly of claim 18 wherein each clip holder further includes:
means for electrically connecting the clip to the first and second surface
mount contacts of that clip holder.